

Commercial Wind Farming



*Dairy Farm Revitalization
Task Force*

Sturbridge, MA

September 7, 2007



Overview of Presentation

- Commercial wind farming
- Municipal ownership
- Small scale wind

EDR

JDH

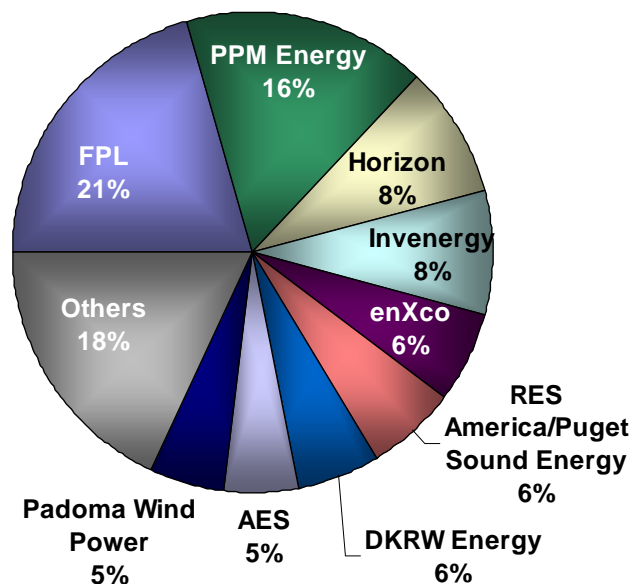


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PPM Wind Power #2 in US Wind Market

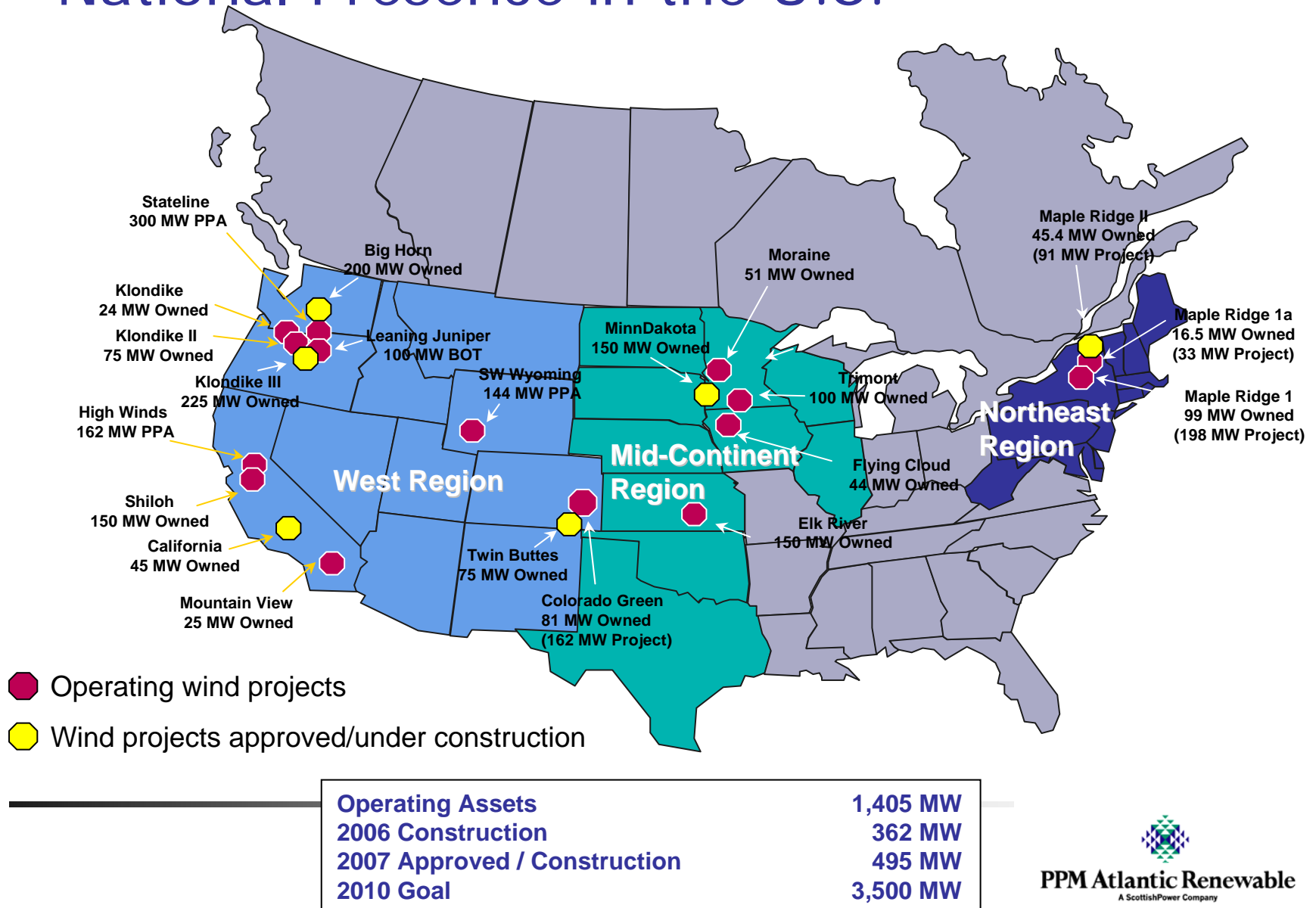
- PPM Energy ranks #2 in US wind development
 - 1,405 MW to '06; 800MW owned
 - Added 574 MW in '06
 - Some 860 MW under construction or announced for '06/'07

Leading 2005 Wind Developers*



* Percentage of total capacity installed in calendar year 2005. Source: American Wind Energy Association

PPM has an Established National Presence in the U.S.



- Projects developed by
PPM Atlantic Renewable
Energy Corp:

- Mill Run (PA) 2001



- Somerset (PA) 2001



- Backbone Mtn. (WV) 2002



- Meyersdale (PA) 2003



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- Fenner (NY) 2001

- Madison (NY) 2000

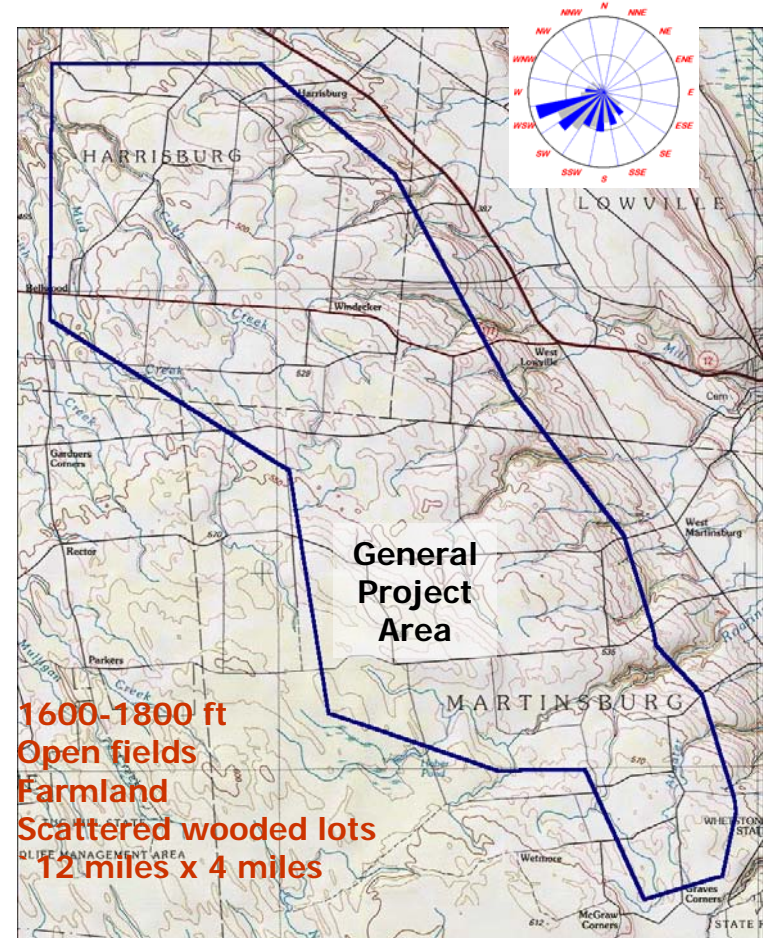


Project description

195 separate 1.65 MW
wind turbine towers...

... built on 74 different
host farms...

...along a 12-mile
array in Martinsburg,
Lowville and
Harrisburg in '05 and
'06



Project description (cont.)

- 44 miles of new gravel access roads
- 69 miles of buried 34.5 kV power line
- 8.7 miles of over-head power line
- 2 new power substations



Each 1.65 MW
wind turbine
generator =
power needed by
about 600 ave
NYS households

(annual average equivalent)



Photos courtesy of J. Harvey, NYSERDA



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325 MW Flat Rock
Wind farm =
power for 160,000
households

= 2% of residential
electric load in NYS
(annual averages)



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A “clean power” project

...without *any* :

- smoke or air pollution
- mining wastes or water pollution
- radioactive waste
- “greenhouse” gases that cause global warming



An “open space” project

Wind farms help:

- support local farm economy – a “3rd crop”
- reduce pressures on landowners to sell, subdivide and/or develop the family farm
- ...thus helping to preserve open farmland
- ...and to sustain some family farms



A “rural farms” project

A complement to conventional farming:

- uses <2% of farm area
- no interference with farming activities after construction is complete



A “rural farms” project

Benefits to farmers:

- rent of \$6.6k - \$12k
- use of new 16' gravel access roads
- full indemnification for taxes and other wind farm liabilities
- all power lines between towers underground



A “rural farms” project

Extensive top-soil preservation measures

- detailed work rules est. by NYS Ag & Mkts.
- topsoil carefully “stock-piled” during construction
- post-construction grading re-establishes original contours



A “rural farms” project

Will wind farms in effect help sustain NYS’s topsoil?

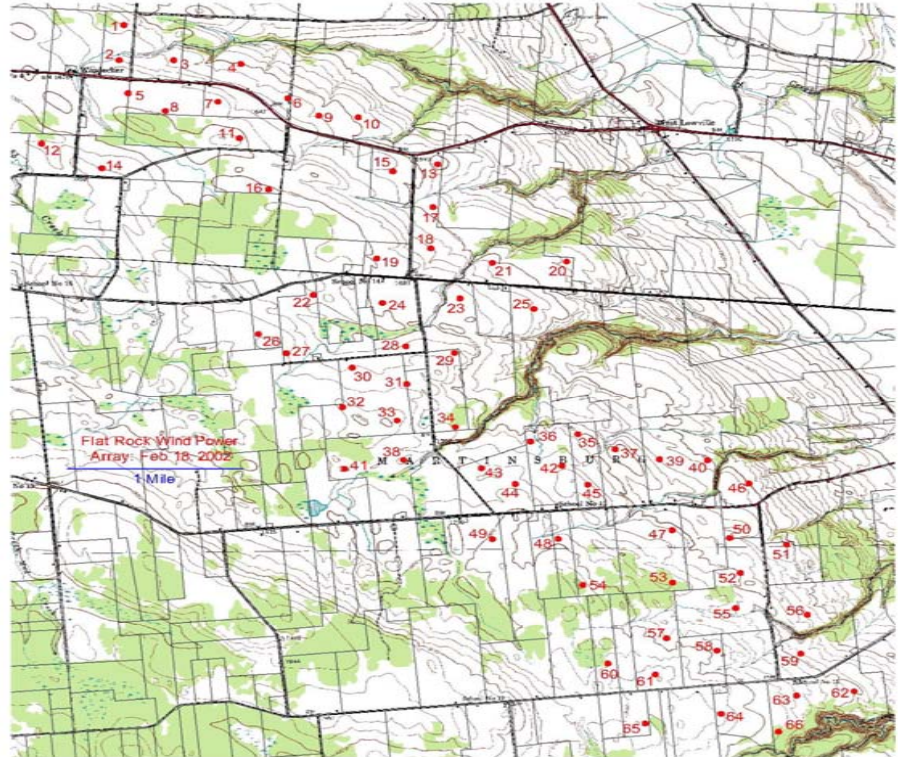
- by saving farms and keeping fields under cultivation?
- by preventing far more disruptive uses (e.g., home subdivisions)?
- by sustaining local farm towns?



A boost to Lewis County

The \$400 MM **Maple Ridge Wind Farm**

*one of the
largest new
infra-structure
projects in the
North County*



A boost to Lewis County

With new jobs, new tax revenue – all told a \$10+ million annual infusion for the local economy



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A boost to Lewis County

*Up to 350
construction
jobs over a 2-
year period...*



A boost to Lewis County



...and 15 to 20 permanent operating employees



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A boost to Lewis County

*Up to \$8.5 million in new
PILOT "taxes" shared by*

- Martinsburg, Harrisburg, Lowville and Watson
- Lowville, Copenhagen & So. Lewis school districts



A boost to Lewis County

*About \$2.0 million+ in total annual royalty payments to 85 host landowners
(equal to hiring approx. 30 to 40 new employees)*



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...they're just plain beautiful. The windmills of Madison County, sleek, dramatic, mesmerizing. Silver streaks rising high over the horizon, hundreds of feet over our heads, their paddles plying the air almost silently. We stand in awe and in praise of what appears, at least, to be a sensible approach to our energy needs.

Syracuse Post Standard
September 2001



Managing local impacts

PILOT Agreement – Between host town, school board, Lewis County and FRWP. Governs sharing of “Payments in Lieu of Taxes”. Puts project in Empire Zone.

Road agreement – Between FRWP and the towns/county. Specifies the local roads to be used for heavy hauling to construct project, with repairs the responsibility of project company.

Neighbor agreements – Between FRWP and WTG neighbors (<3,000' distant). Annual payments offset minor visual/other impacts.



Economics

- Electric energy sold in NY-ISO wholesale market (*physical transaction*)
- “Green power” (RECs) from MR1 sold to NYSERDA (10 yr. term –*financial*)
- Remainder of RECs → bilateral contracts to NYPA & others (*financial*)
- New NYS wind ~ = new conventional power plants (8-10¢ /kWh)
- since '05 wind costs ^ 50% – same as new coal, oil/gas, nuclear



RPS Program

- “Renewable Portfolio Standard”: Sellers required to provide increasing “green power” share of total electric supplies
 - Green power from wind, solar, hydro and biomass becomes part of generating portfolio
 - Cost shared by all ratepayers
 - RPS contracts: sufficient to secure financing given volatile energy markets
-



Municipal wind projects

Municipal Utility Owns and Operates

- Tax exempt financing → lower costs
- RPPI tax credit available
- Farming landowner shares in equity (?)
- All-in power costs levelized over 20 yrs.
- Utility buys a turn-key project from WindCo
- Technical + project + wind risks: → utility ratepayers (i.e. town taxpayers)



Municipal wind projects (cont.)

Muni utility buys energy/capacity through PPA from IPP wind farm

- Tax exempt eligible if 100% → muni
- Utility still locks in 20 yr. levelized cost of power (i.e., no fuel price risk)
- More costly than municipally owned (?)
- Technical + project + wind risk → private lenders and investors
- Market risk → municipal ratepayers
- Farming landowner shares in equity



Municipal wind projects

Other options:

- **Private/Public JV** - Municipal utility owns part of larger privately developed/owned wind farm, using tax-exempt finance for its share
- **MMWEC wind program** – Competitive acquisition of power/green tags from private projects (e.g., PASNY)
- **Town facilities** – 1 or 2 WTGs installed on town owned land with power → school or water/sewer facilities, displacing utility power purchases (e.g., Hull MLD)



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Modular wind projects

Cooperative ownership

- 2-5 WTG wind project jointly owned by multiple farmers and wind IPP:
 - Create RPS program for farmer owned projects only
 - Subsidy supports commercial debt
 - Farmers' equity share builds as debt is paid down
 - Ownership flips to farming landowners after investors achieve IRR
 - Streamline permitting/interconnection/other regulations





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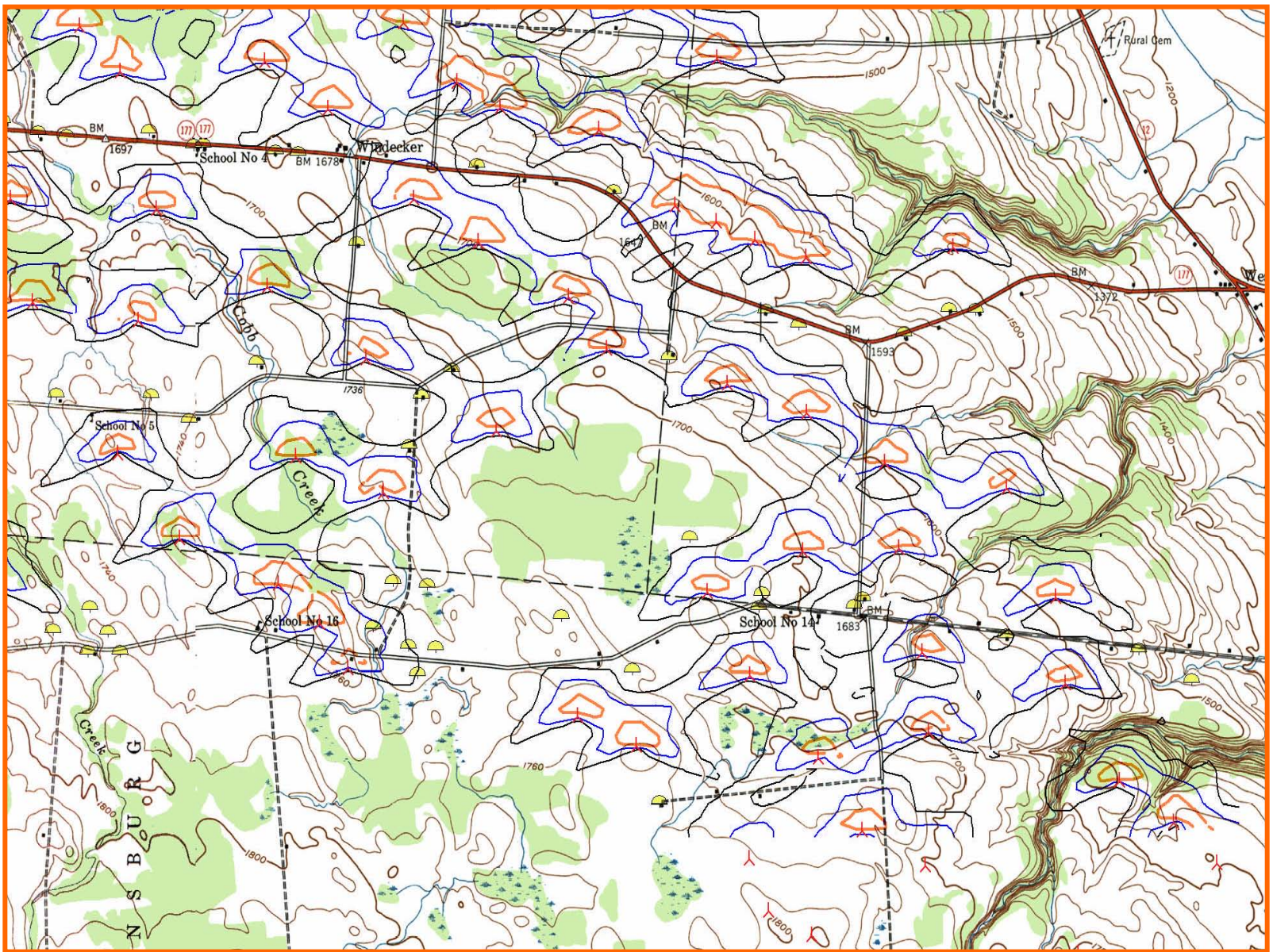


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Incidence of shadow flicker can be modeled precisely

Tower sections stockpiled after
shipment to Port of Oswego



OCT 2 2005



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Each rotor blade is about 136' in length



OCT 2 2005



Each "nacelle" contains the main drive shaft, a gearbox and the 1.65 MW generator

15 10:20 PM



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